



[7590-01-P]

NUCLEAR REGULATORY COMMISSION

10 CFR Part 73

[Docket No. PRM-73-15; NRC-2011-0251]

Installation of Radiation Alarms for Rooms Housing Neutron Sources

AGENCY: Nuclear Regulatory Commission.

ACTION: Petition for rulemaking; denial.

SUMMARY: The U.S. Nuclear Regulatory Commission (NRC) is denying a petition for rulemaking (PRM), PRM-73-15, dated September 15, 2011, which was filed with the NRC by George Hamawy (the petitioner). The petitioner requested that the NRC amend its regulations to require the installation of radiation alarms for rooms housing neutron sources.

DATES: The docket for the petition for rulemaking, PRM-73-15, is closed on **[INSERT DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]**.

ADDRESSES: Please refer to Docket ID NRC-2011-0251 when contacting the NRC about the availability of information for this petition. You may access information related to this petition, which the NRC possesses and is publicly available, by any of the following methods:

- **Federal Rulemaking Web Site:** Go to <http://www.regulations.gov> and search for Docket ID NRC-2011-0251. Address questions about NRC dockets to Carol Gallagher; telephone: 301-492-3668; e-mail: Carol.Gallagher@nrc.gov. For technical questions, contact the individual listed in the FOR FURTHER INFORMATION CONTACT section of this document.

- **NRC's Agencywide Documents Access and Management System (ADAMS):**
You may access publicly-available documents online in the NRC Library at <http://www.nrc.gov/reading-rm/adams.html>. To begin the search, select "[ADAMS Public Documents](#)" and then select "[Begin Web-based ADAMS Search](#)." For problems with ADAMS, please contact the NRC's Public Document Room (PDR) reference staff at 1-800-397-4209, 301-415-4737, or by e-mail to pdr.resource@nrc.gov. The ADAMS accession number for each document referenced in this notice (if that document is available in ADAMS) is provided the first time that a document is referenced. The PRM-73-15 is available in ADAMS under Accession No. ML112700682.

- **NRC's PDR:** You may examine and purchase copies of public documents at the NRC's PDR, Room O1-F21, One White Flint North, 11555 Rockville Pike, Rockville, Maryland 20852.

FOR FURTHER INFORMATION CONTACT: Merri Horn, Office of Federal and State Materials and Environmental Management Programs, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; telephone: 301-415-8126, e-mail: Merri.Horn@nrc.gov.

SUPPLEMENTARY INFORMATION:

The Petition

On December 7, 2011, the NRC published a notice of receipt and request for comment (76 FR 76327) of a PRM filed by George Hamawy. The petitioner requested that the NRC amend its regulations to require installation of radiation alarms for rooms housing neutron sources. The petitioner stated that the use of alarms can be effective in preventing source removal, especially when an in-house person may be taken hostage to get the intruder into the room housing the source. The petitioner noted that the construction of the neutron sources used by universities for irradiating foils makes the source an easy target for theft. The petitioner also noted that the source is located at the end of a rod in the middle of a 55-gallon drum and that the drum has a cover that can be easily removed, facilitating the removal of the source. The petitioner stated that radiation alarms should be installed that are connected to the Public Safety Department. The alarm would be triggered when the source is removed.

Public Comments on the Petition

The notice of receipt of the petition for rulemaking invited interested persons to submit comments. The comment period closed on February 21, 2012. The NRC received two comment letters from industry, one comment letter from an individual, and one comment letter from the Organization of Agreement States. The commenters all opposed the petition. Two of the commenters stated that the petition should not apply to the well logging industry. The commenters stated that the petition request was vague in terms of the definition of room, types

of radiation alarms, connectivity to law enforcement, the isotopes included, and the threshold for action. Two of the commenters noted that their sources are stored by methods approved by the NRC (or Agreement State) and as prescribed in national standards established by the well logging industry and that additional requirements are not necessary. One of the commenters questioned why anyone would want to steal a neutron source and asked if any neutron sources have ever been stolen. The commenter also stated that natural background may contain more radiation than the neutron sources and, therefore, a radiation detector would not detect the removal of the sources. The commenter also asked if it would be possible to shield the neutron source from the detector while stealing the source. The commenter also stated that there is no reason that any person would respond to the alarm. The commenter stated that the best solution is to put the barrel in a locked room. One of the commenters noted that the typical strength of a neutron source used in a university is less than the category 2 threshold. The commenter also stated that the regulations currently require a licensee to have security measures in place to “secure from unauthorized removal or access licensed materials that are stored in controlled or unrestricted areas.”

Reasons for Denial

As noted by the commenters on the petition, the petitioner did not provide information relative to the source strength of the neutron sources or the particular radionuclides for which the petitioner is requesting additional security measures be imposed by rulemaking. It is not clear whether the petitioner is requesting rulemaking on all neutron sources or only on the americium-241/beryllium (Am-241/Be or Am/Be) and plutonium-239/beryllium (Pu-239/Be or Pu/Be) sources mentioned in the petition. The NRC is taking the view that the petitioner is requesting rulemaking for all neutron sources regardless of source strength.

There are a number of different sources of neutrons, ranging from radioactive sources to operating and research reactors and spallation sources. Neutron sources are used in diverse applications in areas of physics, engineering, medicine, nuclear weapons, petroleum exploration, biology, chemistry, nuclear power, and other industries.

Radioactive materials used as neutron sources by NRC licensees include Am-241/Be, Pu/Be, and californium-252 (Cf-252). A licensee's decision to use a specific type of source may depend upon cost, availability, and the dependence upon historical data with which to compare current measurement results. The Am-241/Be and Pu/Be sources generate neutrons by the (α ,n) reaction in which the americium or plutonium decays and emits an alpha particle, which is absorbed by the beryllium. Neutron sources that are not integrated into a specific device, regardless of type, are generally stored surrounded by paraffin wax or other similar low atomic number material as shielding.

Both Am-241/Be and Pu/Be sources have a wide range of uses. Neutron sources can be used with online elemental coal analyzers and bulk material analyzers in the coal and cement industries. Neutron penetration into materials makes these sources useful in analytical techniques such as radiography of aircraft components to detect corrosion, imperfections in welds, cracks, and trapped moisture. Moisture gauges use neutrons to find water and petroleum layers in oil wells, known as well logging. Neutron sources can be used for gold and silver prospecting for on-the-spot analysis, and to detect ground water movement for environmental surveys. Neutron sources are also used as calibration sources.

Californium-252 sources produce neutrons during spontaneous fission. The Cf-252 splits apart producing a number of neutrons in the process. Beyond the uses mentioned above for Am/Be and Pu/Be sources, the neutrons from Cf-252 are employed as a treatment of certain cervical and brain cancers where other radiation therapy is ineffective. The Cf-252 sources are also used to start up nuclear reactors.

The categorization of sources is established in International Atomic Energy Agency (IAEA) Safety Series RS-G-1.9, Categorization of Radioactive Sources. Safety Series RS-G-1.9 provides a risk-based ranking of radioactive sources in five categories in terms of their potential to cause severe deterministic effects for a range of scenarios that include both external exposure from an unshielded source and internal exposure following dispersal. The categorization system uses “D values” as normalizing factors. The “D value” is the radionuclide specific activity of a source that, if not under control, could cause severe deterministic effects for a range of scenarios that include both external exposure from an unshielded source and internal exposure following dispersal of the source material. Safety Series RS-G-1.9 is available on the IAEA Web site at: http://www-pub.iaea.org/MTCD/publications/PDF/Pub1227_web.pdf.

As previously noted, neutron sources are used for a variety of purposes and in varying source strength. Depending on the source strength (activity), the source is considered a category 1 (higher activity) to a category 5 (lower activity) source. The threshold is established for each individual radionuclide. For Am-241/Be and Pu-239/Be, a category 5 source is any source with an activity of less than 0.0006 Terabequerels (TBq) (0.016 curies (Ci)) and a category 1 source is any source with an activity of 60 TBq (1,620 Ci) or above. For Cf-252, the category 5 threshold is 0.0002 TBq (0.00054 Ci) and the category 1 threshold is 20 TBq (540 Ci).

The NRC’s regulations in § 20.1801 of Title 10 of the *Code of Federal Regulations* (10 CFR), “Security of stored material,” and 10 CFR 20.1802, “Control of material not in storage,” require licensees to: 1) secure, from unauthorized removal or access, licensed materials that are stored in controlled or unrestricted areas; and 2) control and maintain constant surveillance of licensed material that is in a controlled or unrestricted area and that is not in storage. The NRC’s regulations in 10 CFR 20.2201, “Reports of theft or loss of licensed material,” require licensees to report lost, stolen, or missing radioactive material. Further, throughout the NRC’s

regulations for licensing byproduct material, there are educational and training requirements to ensure that individuals with access to radioactive materials have adequate knowledge and skills to safely use the radioactive material as intended. These requirements are adequate for the protection of most radioactive material that is not subject to 10 CFR part 73, "Physical Protection of Plants and Materials;" however, after the terrorist attacks of September 11, 2001, the Commission determined that certain risk-significant radioactive material should be subject to enhanced security provisions. The NRC issued several security orders to licensees that possessed category 1 and category 2 quantities of radioactive material of 16 radionuclides or combinations. Included in the list of radionuclides considered to be risk-significant are Am-241/Be, Pu-239/Be, and Cf-252. In general, the orders provided requirements for enhanced security measures for such things as license verification before transfer, intrusion detection and response, use of security zones, access control, and coordination with local law enforcement agencies (LLEAs). The orders also contain requirements for the licensee to determine the trustworthiness and reliability of individuals permitted unescorted access to category 1 or category 2 quantities of radioactive material through fingerprinting and criminal history checks and other elements of a background investigation.

On March 19, 2013, the NRC published the final rule (78 FR 16922) that establishes the security requirements for category 1 and category 2 quantities of radioactive material (including Am-241/Be, Pu-239/Be, and Cf-252) in the regulations. Once the final rule is implemented, the security orders will be rescinded. The final rule establishes a new part to 10 CFR, part 37, "Physical Protection of Category 1 and Category 2 Quantities of Radioactive Material." This final rule also applies to material that if aggregated equals or exceeds the category 2 threshold. Both the orders and 10 CFR part 37 contain general requirements that allow licensees flexibility in how they meet the requirements. For example, 10 CFR part 37 requires licensees to monitor and detect without delay all unauthorized entries into its security zone where category 1 or

category 2 quantities of radioactive material are stored. Part 37 of 10 CFR further requires licensees to assess attempted or actual unauthorized entries and respond as appropriate. However, neither the orders nor 10 CFR part 37 specifies exactly how a particular licensee must monitor and detect such unauthorized entries. Instead, the orders and 10 CFR part 37 allow flexibility in the methods a licensee can select. A neutron detection alarm could be an acceptable method.

The NRC is denying the petition because we have determined that current NRC security requirements are adequate to protect public health and safety. The Commission has recently determined the appropriate activity threshold that warrants additional security measures in the 10 CFR part 37 rulemaking (category 2). The Commission did not find a need to change the requirements applicable to category 3 or lower. The petitioner has not provided sufficient reason to readdress this decision. Additionally, the Radiation Source Protection and Security Task Force, an interagency task force established by the Energy Policy Act of 2005, concluded in its report to Congress and the President, "Radiation Source Protection and Security Task Force Report" (ADAMS Accession No. ML062190349), dated August 2006, that the appropriate radioactive sources (category 1 and category 2 sources) were being protected. The Task Force also concluded that the IAEA Code of Conduct serves as an appropriate framework for considering which sources warrant additional protection. For its 2010 report to Congress and the President (ADAMS Accession No. ML102230141), the Task Force conducted a reevaluation of the radionuclides that warrant additional security and protection. The Task Force found "that the Category 1 and 2 quantities remain valid for sealed and unsealed sources as the list and threshold levels of radionuclides that could result in a significant radiological exposure device (RED) or radiological dispersal device (RDD) event and therefore warrant enhanced security and protection." The Task Force periodically reevaluates the list of radionuclides that warrant

additional security and protection. If the radionuclides and/or thresholds change in the future, then the NRC would consider making changes in a future rulemaking.

For byproduct material below the category 2 thresholds, the security of radioactive material is covered by 10 CFR 20.1801 and 20.1802. The requirement to “secure, from unauthorized removal or access” and to “control and maintain constant surveillance” are considered performance-based requirements. Licensees are allowed to select methods that work best for their facility to ensure that there is no unauthorized removal of the category 3 and lower neutron sources. These requirements provide adequate protection for the neutron sources, without the need to require a specific measure.

In conclusion, no new information has been provided by the petitioner that calls into question the established thresholds (category 2) that warrant additional security measures or the performance based approach (non-prescriptive) for ensuring source security. This view has been validated by the Radiation Source Protection and Security Task Force’s conclusions. Existing NRC regulations provide the basis for reasonable assurance that the common defense and security and public health and safety are adequately protected. Additional rulemaking would impose unnecessary regulatory burden and is not warranted for the adequate protection of the public health and safety and the common defense and security.

The NRC appreciates the views of the petitioner and encourages feedback from the public on any of the NRC processes.

For the reasons cited in this document, the NRC is denying PRM-73-15.

Dated at Rockville, Maryland, this 5th day of April, 2013.

For the Nuclear Regulatory Commission.

Andrew L. Bates,
Acting Secretary of the Commission.

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